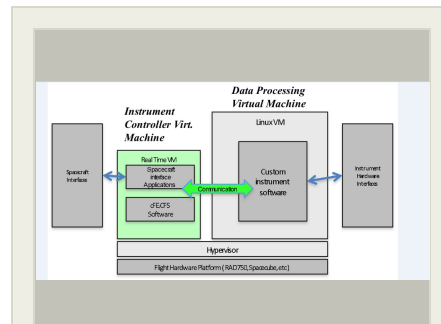## Project Introduction

Utilize Hardware Virtualization technology to benefit on-board science data processing by investigating new real time embedded Hardware Virtualization solutions and applying them to a science data processing application. Successful implementation will result in an instrument computer that has two types of virtual machines: 1. A real time communication and control virtual machine with a Core Flight Executive. 2. One or more Linux virtual machines for on demand instrument data processing.

If successful, the project will produce a prototype embedded hypervisor system that consists of a of a LEON3 processor board, a real time Core Flight Executive Virtual Machine, and a Science Data processing Virtual Machine. The system will be benchmarked against the standard embedded software running on the LEON3 in order to evaluate the performance impact of the embedded hypervisor. Detailed steps include: 1. Research and Purchase Hardware and Software 2. Define Software Development Environment 3. Setup Lab and Software Development Evironment 4. Establish Configuration Management System 5. Prototype Virtualization Environment 6. Integrate Hypervisor Software 7. Design/Document Virtual Machine Deployment and Communication Software 8. Develop Virtual Machine deployment and Communication Software 9. Develop/port Linux data processing software 10. Design and develop tests 11. Run tests 12. Document Results and plan follow on work.

Anticipated Benefits

Decreased software integration and debug time. Increase in reliability due to memory protection and isolation.

Flight Hardware Virtualization for On-Board Science Data Processing Project
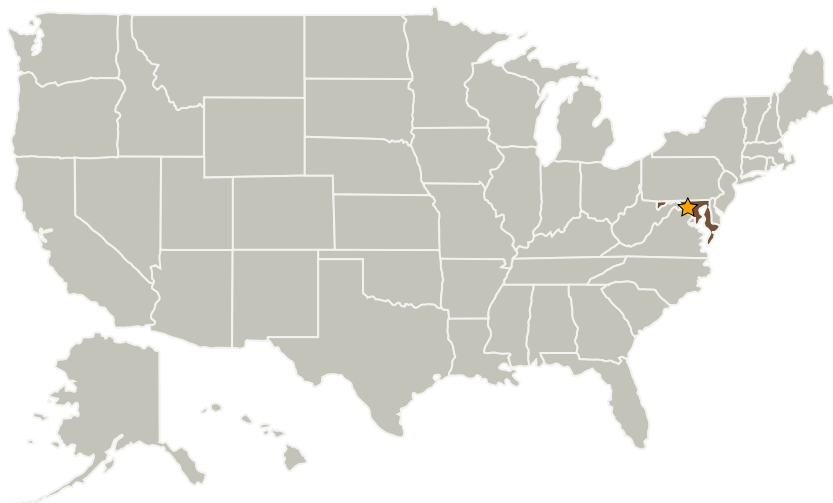
Table of Contents

For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/14777

Primary U.S. Work Locations and Key Partners

Organizations Performing Work	Role	Type	Location
⭐Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Maryland

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Innovation Fund: GSFC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

Peter M Hughes

Project Manager:

Jacqueline J Le Moigne-stewart

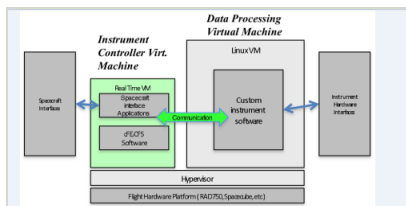**Principal Investigator:**

Alan P Cudmore

Co-Investigator:

Kequan Luu

Images

Flight Hardware Virtualization for On-Board Science Data Processing Project
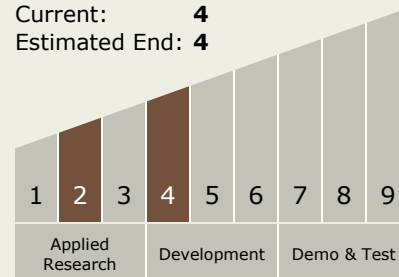Flight Hardware Virtualization for On-Board Science Data Processing Project
(https://techport.nasa.gov/image/4087)

Project Website:

http://aetd.gsfc.nasa.gov/

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  └ TX11.4 Information Processing
    └ TX11.4.2 Intelligent Data Understanding